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ETL 1110-2-231

Technical Letter
No. 1110-2-231

30 March 1979

Engineering and Design
Initial Reservoir Filling Plan

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Office of the Chief of Engineers
Washington, D.C. 20314

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Engineer Technical
Letter No. 1110-2-231

30 March 1979

Engineering and Design
INITIAL RESERVOIR FILLING PLAN

1. Purpose. The purpose of this ETL is to furnish guidance for preparing a surveillance plan for the initial filling of Corps reservoirs.

2. Applicability. This ETL is applicable to all Divisions and Districts having Civil Works responsibilities.

3. References.

- a. ER 1110-2-1150
- b. ER 1130-2-419

4. Discussion. The "initial reservoir filling" is defined as a deliberate impoundment to meet project purposes and is a continuing process as successively higher pools are attained for flood control projects. The initial reservoir filling is the first test of the dam to perform the function for which it was designed. In order to monitor this performance, the rate of filling should be controlled to the extent feasible to allow as much time as needed for a predetermined surveillance program including the observation and analysis of instrumentation data. Information furnished in the filling plan should generally be concerned with action that can be taken without a significant impact on project purposes, provided no unsafe conditions are observed. The filling plan should be prepared by the Engineering Division in cooperation with the Construction and Operations Division.

5. Action.

a. A design memorandum which outlines an initial reservoir filling plan will be prepared for all new Corps reservoir projects prior to the initiation of reservoir filling for operational purposes. Attached as inclosure 1 is an example of such a plan which was prepared for Lost Creek Lake in the North Pacific Division (NPD). ER 1110-2-1150 is presently under revision and published in draft form to be used for interim guidance until finalized. The revised ER includes the requirements for preparing the Design Memorandum. The design memorandum should be prepared after all pertinent hydrologic, hydraulic, structural and geotechnical information has been developed during design and construction.

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b. Existing projects that are operational, where the maximum pool has not been experienced, should be reviewed and the O&M manual modified, if necessary, to include the information delineated in paragraph 6.

6. Design Memorandum Content. The design memorandum should include but not be limited to the following:

a. Preferred filling rate and the available options to control the rate of filling as well as the consequences of operation with prime objective of controlling the rate of reservoir rise.

b. The most likely type of problem that might develop during initial filling and the surveillance necessary to detect those problems.

c. A plan for reading the instruments and evaluating the data with regard to the filling plan.


d. A plan for inspecting the dam and downstream areas prior to and during filling, including the relationship between frequency of inspection and rate of pool rise.

e. Instructions for observers on conditions that require immediate attention of personnel authorized to make emergency decisions. Clearly identify who is responsible for decisions and how they can be contacted. Alternate decision makers should also be identified.

f. An emergency plan listing responsibilities, name and/or positions, telephone numbers and radio frequencies to be used. (See ER 1130-2-419.)

FOR THE CHIEF OF ENGINEERS:

1 Incl
Initial Filling Plan

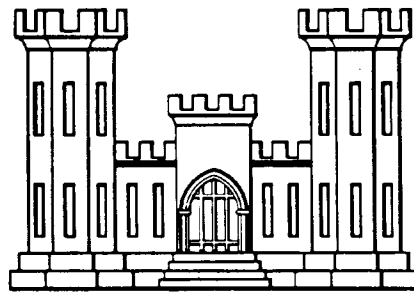

JACK R. THOMPSON
Acting Chief, Engineering Division
Directorate of Civil Works

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LOST CREEK LAKE

ROGUE RIVER, OREGON

INITIAL FILLING PLAN



U. S. ARMY ENGINEER DISTRICT, PORTLAND

CORPS OF ENGINEERS

PORTLAND, OREGON

OCTOBER 1976

INCLOSURE NO. 1



DEPARTMENT OF THE ARMY
PORTLAND DISTRICT CORPS OF ENGINEERS
P. O. BOX 2946
PORTLAND, OREGON 97208

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30 Mar 1979

REPLY TO
ATTENTION OF:

1 October 1976

OPERATION ORDER
LOST CREEK LAKE POOL RAISE

1. Purpose: This operation order provides the basic plan for raising Lost Creek Lake. It assigns duties for various Corps elements and outlines co-operative efforts needed with concerned outside agencies.
2. Principles Underlying the Pool Raise Plan: The plan of pool raise is based on the following considerations. There are three critical, inter-related elements of the closure which, to some extent, make conflicting demands on the operation. Those are (a) lowering the stoplog, (b) raising the pool on the embankment dam, and (c) constructing the tunnel plug.

(a) The concerns of lowering the stoplog are as follows: Low river flows at closure increase the chances of making a successful closure, whereas high flows will minimize the magnitude of fishery losses downstream. If the river flow is 1,000 c.f.s. at closure, the depth of water will be about 6 feet. If it is 2,000 c.f.s. the depth will be about 10 feet. A 2,000 second-feet flow or more is desirable for the fish, but that flow increases the hazard of making a successful closure. If the stoplog does not go all the way down, yet cannot be lifted out for another try (either from jamming or lack of crane capacity to overcome friction and downpull), there is probably only one option left--dumping rock upstream of the portal to create an embankment-type closure. Besides possible delays, etc. which might result, the fish run downstream could be destroyed because the life-sustaining flow through the stoplog would be cut off by the fill. Our solution is to make closure during the beginning of a rainstorm when the river flow is between 1,000 and 1,500 c.f.s. and is rising, with every indication that a flow of at least 2,000 c.f.s. of reservoir

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Operation Order, Lost Creek Lake Pool Raise - cont'd

inflow will be reached within a matter of a very few hours. (Pumping water through the regulating outlet is not practicable because of the large flow required--700 c.f.s.--and the large head involved. We have, therefore, decided to do everything possible to assure a successful closure with the stoplog.) To mitigate for reducing the downward river flows below the minimum 700 c.f.s. recommended by the fish agencies at closure, critical salmon spawning areas will be sprayed with water until an adequate flow is provided through the bypass gate in the stoplog. To minimize the pumping time required and any other adverse effects, the closure will be made under favorable weather conditions.

(b) The criticality of raising the pool stems from the fact that severe rainstorms can cause an uncontrollable rising or unlowerable level of the reservoir surface during periods when the reverse would be demanded either for proper monitoring of the dam on the first filling or for the safety of the structure itself if unanticipated seepage occurs. Our solution to this problem is to divide the filling into two parts--that below a certain elevation where practically no downstream hazard exists and that above the elevation where loads, pressures, and volume of reservoir storage become significant. The first part of the filling, above the regulating outlet, would be done with a constant 1,000 c.f.s. flow being discharged through the regulating outlet. That is the minimum needed for fish and would provide minimum interference for the construction of the diversion tunnel plug which is covered in item (c). At the same time, whatever rate of filling occurred from the rainfall received probably would not create a safety hazard. If at any time, however, during the first part of the filling any serious unanticipated seepage of the dam or foundation occurred, the outlet flow would be increased to lower the reservoir as much as possible and the emergency procedure would be activated. The second part of the filling would be based on controlling as much as possible the rate of rise of the reservoir to provide optimum conditions for monitoring the filling. Should reservoir inflow exceed the ability of the outlet to regulate the flow, the water surface would rise above the preplanned rule curve; however, it would be lowered to that preplanned curve as soon as

Operation Order, Lost Creek Lake Pool Raise - cont'd

possible by full use of the regulating outlet. Once back on the rule curve, the curve would be followed until another unregulatable inflow occurred. Should at any time any serious unanticipated seepage be observed, the emergency procedures would be activated and the regulating outlet gate would be opened completely, if it were not already in that position.

It should be added that if the reservoir inflow is insufficient to reach the preplanned filling curve at any time, the preplanned filling curve would be translated horizontally as far as necessary to keep the actual reservoir elevation curve from being below the preplanned filling rule curve. If, however, the reservoir had previously been fully monitored to a higher elevation, that higher elevation could again be reached by filling as fast as possible if the inflow became sufficient to do so.

Finally, when the routine reservoir regulation curve is reached, that curve would supplant the preplanned filling rule curve for the remainder of the filling. However, the controls on reservoir rate rise and manner of regulating a flood would be the same as for the preplanned curve mentioned above. Monitoring will continue until full pool is reached. If not reached the first year, the special filling monitoring group would be deactivated at the highest reservoir elevation reached and reactivated in succeeding years, as necessary, to assure that the initial reservoir filling throughout the complete range of elevations has been monitored.

(c) The problem with the plug construction is that the higher the water surface in the reservoir the greater the hazard to the workmen inside the tunnel and the more the leakage that would have to be handled by the contractor. Yet the regulating outlet flows needed to keep the water surface down could interfere with the contractor's entry to the tunnel.

Operation Order, Lost Creek Lake Pool Raise - cont'd

Our solution is to store as much water as possible during the early filling of the reservoir to minimize interference with the contractor, and construct the plug as fast as possible. Should the plug not be complete when the reservoir reaches the level between the adopted first and second filling stages, the contractor would have to interrupt his tunnel work every time large releases from the regulating outlet are required.

3. Scope: This Operation Order includes the following appendices:

- a. Appendix A - Water Control Plan.
- b. Appendix B - Project Surveillance.
- c. Appendix C - Fish Egg Protection and Surveillance.
- d. Appendix D - Contingency Plan.
- e. Appendix E - Safety Plan.
- f. Appendix F - Public Affairs.
- g. Appendix G - Prefilling Inspection Team Recommendations.
- h. Appendix H - Transportation and Communications.

4. Implementation: Placing this Operation Order into effect will be the responsibility of Mr. Robert Martin, Resident Engineer. He will keep the District Engineer advised as to progress, problems and actions being taken. All echelons will report to the Resident Engineer. Mr. Martin will be assisted by Mr. Vince Steinkamp. After the lake filling has been fully monitored to elevation 1751, the responsibility for the filling plan will transfer to the Project Engineer.

5. Preliminary Actions: The following actions must be taken prior to actual raising of the pool.

Operation Order, Lost Creek Lake Pool Raise - cont'd

- a. Inspection Team recommendations have been completed.
- b. Telephone lines and power lines have been removed from pool area below elevation 1751.
- c. All necessary construction to be covered by pool is completed.
- d. Roads leading into lake have been signed and barricaded as needed.
- e. Fish egg sprinkler system has been checked out.
- f. All other preliminary actions required by this operation order.
- g. Advance press release issued on 8 October.
- h. When conditions appear favorable for closure the following will be notified one day in advance of intended closure date if possible: (If conditions favorable for closure occur without advance warning, the one-day advance notice will not be given. Notification will be given as far in advance of closure as possible; however, at least 6 hours notice is required.)

(1) The Resident Engineer will notify the following:

- (a) District Engineer
- (b) Chief, Construction Division
- (c) Local office of State Police
- (d) County Sheriff
- (e) Local State Highway Maintenance Office
- (f) Pacific Power and Light
- (g) Medford Office of U.S. Geological Survey
- (h) Medford Office of U.S. Weather Service
- (i) Mike Evenson, ODFW, Cole Rivers Hatchery

(2) Portland District Engineer will notify the North Pacific Division Engineer.

Operation Order, Lost Creek Lake Pool Raise - cont'd

- (3) Chief, Construction Division will notify the following:
 - (a) Chief, Engineering Division
 - (b) North Pacific Division Chief, Construction Division
 - (c) Public Affairs Office
 - (d) Chief, Project Operations

- (4) Chief, Engineering Division will notify:
 - (a) North Pacific Division Chief, Engineering Division
 - (b) Chief, Foundations and Materials Branch
 - (c) Chief, Design Branch
 - (d) Chief, Planning Branch
 - (e) Rogue River Coordinator

- (5) Chief, F&M Branch will notify:
 - (a) North Pacific Division Chief, GS and M Branch
 - (b) State Highway Engineering Department

(6) Rogue River Coordinator will notify private environmental and sportsmen groups.

- (7) Mike Evenson will notify the fishery agencies.

- 6. Final Closure Actions: On day of closure the following actions must be taken:
 - a. Fish and Wildlife representatives' final approval for closure received.
 - b. District Engineer gives approval to proceed with closure.
 - c. Same notification as in paragraph 5h, regardless of whether the decision is to proceed or to reschedule.

Operation Order, Lost Creek Lake Pool Raise - cont'd

- d. Fish egg sprinklers put into operation.
 - e. PP&L Big Butte Creek Works notified (6 hours in advance).
 - f. Contractor directed to lower stoplog.
 - h. Immediately notify District Engineer that stoplog is in place.
7. All District elements are directed to give maximum support to the pool filling operation.



HARVEY L. ARNOLD, JR.
Colonel, Corps of Engineers
District Engineer

Incls

APPENDIX A

WATER CONTROL PLAN

INITIAL LOST CREEK FILLING

1. Closure Criteria.

- a. Diversion tunnel stoplog to be lowered between 15 Oct and 1 Dec 76.
- b. Resident Engineer to alert interested parties of "intent to close the following day" if conditions are then suitable.
- c. Resident Engineer's recommendation for closure to be furnished District Engineer at least 6 hours in advance of proposed closure time. With District Engineer's preliminary approval, Resident Engineer notifies PP&L to return Eagle Point Power flow to Big Butte 6 hours prior to proposed closure.
- d. Fishery Agencies' approval for closure received by Resident Engineer through Mike Evenson prior to lowering stoplog.
- e. District Engineer's final approval for closure received by Resident Engineer prior to lowering stoplog.
- f. Flow between 1,000 and 1,500 cfs and rising and expected to rise to 2,000 cfs within a few hours.
- g. Weather forecast for air temperatures above freezing but less than 55° F. for three to four days. Rain forecast for the following 24 hours.
- h. PP&L's Big Butte Creek diversion has been closed down at least 6 hours before closure.
- i. For safety reasons, closure to start during daylight conditions and prior to 4:00 p.m.
- j. Sprinkler system confirmed to be operating at time of closure.

WATER CONTROL PLAN Cont'd

k. It may not be feasible to meet all of the above desired conditions simultaneously. If so, closure may have to be made under less than the full satisfaction of all of the criteria at the District Engineer's decision.

2. Resident Engineer Responsibilities.

a. Overall charge of closure and filling operation until responsibility is transferred to Project Operations. (Transfer at pool elevation 1751.)

b. Install forebay staff gages and downriver staff gages at spawning areas.

c. Read forebay and downriver staff gages and furnish data to Hydrology Section.

d. Supervise project surveillance activities.

e. Coordinate with Fishery Agencies through Mike Evenson on closure timing.

f. Coordinate with PP&L to insure closure of their diversion facilities on Big Butte Creek 6 hours before lowering stoplog. Alert PP&L of "intent to close" the day prior to actual closure.

3. Hydrology Section Responsibilities.

a. General.

(1) When requested by Resident Engineer, Hydrology will dispatch personnel to the project to advise Resident Engineer on weather and river conditions and forecasts.

WATER CONTROL PLAN Cont'd

(2) Furnish inflow, outflow, and lake elevation to interested parties.

(3) Monitor water quality (inflow, outflow and lake) information received from Project Operations.

(4) Develop initial and ongoing hydrologic information such as filling probabilities, effect of flood situations, filling rates, etc.

(5) Notify Resident Engineer through Chief, Engineering Division if and when changes in the release criteria or filling schedule must be made.

(6) Parties to be furnished above information:

PROJECT ENGINEER LOST CREEK LAKE PROJECT	CHIEF, HYDROLOGY SECTION PLANNING BRANCH ENGINEERING DIVISION
AREA ENGINEER ROGUE RIVER BASIN PROJECTS	CHIEF, HYDRAULIC DESIGN SECTION DESIGN BRANCH ENGINEERING DIVISION
RESERVOIR CONTROL CENTER WATER CONTROL BRANCH NORTH PACIFIC DIVISION	CHIEF, F&M BRANCH ENGINEERING DIVISION
CHIEF, ENGINEERING DIVISION	CHIEF, DESIGN BRANCH ENGINEERING DIVISION
CHIEF, CONSTRUCTION DIVISION	CHIEF, PLANNING BRANCH ENGINEERING DIVISION

b. Phase 1. (Before lowering of stoplog.)

(1) Gages and Water Quality Stations.

(a) Insure inflow gages are operational.

(b) Insure reservoir water level gage is operational.

(c) Insure outflow gages are operational.

WATER CONTROL PLAN Cont'd

(d) Establish water quality stations.

(2) Weather and Streamflow Monitoring.

(a) Provide up-to-date record of streamflow and forecasts.

(b) Provide up-to-date record of weather and forecasts
(temperature, precipitation, cloud cover, etc.).

(c) At first sign of possible conditions conducive to lowering stoplog, immediately notify Resident Engineer; District Engineer; Chief, Engineering Division; and Chief, Construction Division. Upon request of the Resident Engineer, Jeff Hanson will immediately go to the project to provide on-site assistance to Resident Engineer with forecasts.

c. Phase 2. (From lowering of stoplog until closing of bypass gate in stoplog.)

(1) Collect and distribute data to interested parties on inflow, pool and outflow gages.

(2) Provide up-to-date weather and streamflow forecasts (at-the-project assistance if required).

(3) Monitor water quality inflow, outflow, and pool as required.

d. Phase 3. (From closing of bypass gate in stoplog until reaching first full pool.)

(1) Collect and distribute data to interested parties on inflow, pool and outflow gages.

(2) Provide up-to-date weather and streamflow forecasts (at-the-project assistance if required).

WATER CONTROL PLAN Cont'd

(3) Monitor water quality inflow, outflow, and pool as required.

(4) Coordinate with NPD Reservoir Control Center and Resident Engineer regarding daily reservoir operations. Provide plans to interested parties.

4. General Information.

a. Reservoir regulation will be the responsibility of NPD Reservoir Control Center in Phase 3.

b. Downstream water levels in vicinity of spawning areas will be monitored by Resident Engineer until decision to discontinue sprinkling is reached.

c. The following table shows the minimum flows that Fishery Agencies desire for fishery enhancement.

<u>Fishery Enhancement Outflows</u>	<u>cfs</u>
1 February - 30 April	700
1 May - 15 May	1,000
16 May - 31 May	1,300
1 June - 10 June	1,500
11 June - 30 June	1,800
1 July - 20 August	2,000
21 August - 7 September	1,500
8 September - 31 January	1,000

WATER CONTROL PLAN Cont'd

5. Detailed Reservoir Regulation Plan. Regulation will be consistent with draft Reservoir Regulation Manual except:

a. Until the pool reaches elevation 1,700, the outflow will be maintained at the lesser of 1,000 cfs or inflow, and the pool will be allowed to fill at any rate in event of flood.

b. When the pool exceeds elevation 1,700, the rate of pool rise will be limited to 3 feet/day, if possible, by increasing outlet flows up to their full capability (see attached rating curve). The outflow (through 1 Feb 77) during fill periods will be:

(1) Equal to inflow if inflow is less than 1,000 cfs.

(2) 1,000 cfs if inflow equals 1,000 cfs or more and rate of rise is less than 3 feet/day.

(3) As required to limit rate of rise to 3 feet/day if possible.

c. Following short-term flood storage 10 feet in excess of that from the preplanned filling rule curve, the pool will be evacuated as rapidly as feasible at a rate not to exceed 5 feet/day to the elevation that would have developed if no flood had occurred and the pool had filled at a rate of 3 feet/day. Pool filling will then restart under guidelines of paragraph 5b above.

d. When the pool intersects the routine reservoir rule curve and does not require evacuation under the provisions of paragraph 5c, further filling will be controlled by the routine reservoir rule curve. Flood control storage will be restricted until full pool has been reached by retention

WATER CONTROL PLAN Cont'd

of the 3 feet/day maximum fill rate except that the spillway will not be used to restrain fill rate unless called for by the Special Spillway Regulation Curve in the draft Reservoir Regulation Manual.

e. For examples of regulation and rule curves, see the attached drawings.

6. Water Control Personnel.

George Holmes--Alternate Jeff Hanson
Closure

District Office
503 221-6470
Home: 503 655-4416

Jeff Hanson--Alternate George Holmes
Weather & Streamflow
Monitoring & Forecasting

District Office
Project Site
NPP 503 221-6468
Home: 503 655-2909

Doug Larson--Alternate George Holmes
Water Quality--Monitoring

District Office &
Project Site
503 221-6471
Home: 503 224-3501

APPENDIX B
PROJECT SURVEILLANCE

General. General surveillance will be carried out by Project personnel under the direction of Mr. Robert Martin assisted by Mr. Vince Steinkamp and a District survey party. Mr. Steinkamp will be available to the Project to help supervise the surveillance until the pool reaches elevation 1872 - Full Pool. A secondary team composed of a Soils Engineer and a Geologist from the District Foundation & Materials Branch will make regular inspections and be available if any problems develop. In addition, should major problems develop, the above team will be supplemented by District Engineering Staff as required.

Damsite. Instrumentation of the main embankment dam includes 15 Hall type piezometers in the impervious zone at Station 27+00, and 9 open tube, Casagrande type, piezometers in the foundation gravels on the left bank terrace at the downstream toe of the embankment dam. Six additional open tube type piezometers are being installed in the foundation along the downstream toe; one on the right abutment, two on the right abutment slope, one in the valley floor at the toe of the left bank, one in the buried channel on the left bank terrace, and one on the left abutment. In addition the outfall from the downstream drainage system is equipped with a weir.

Twenty (20) surface monuments have been installed along the crest of the dam and will be used to measure settlement and deflection.

Six Strong Motion Accelerographs will be installed by the Seismic Engineering Branch of the U. S. Geological Survey, two

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on the crest of the embankment dam, one on the left abutment, one on a rock outcrop about 1,800 feet downstream of the left abutment, and two in the intake tower. The Seismic Engineering Branch of the U. S. Geological Survey will service and collect the data from these instruments.

Visual inspection will be made of the dam and downstream abutment slopes to check for seepage, sloughing, and erosion. Also visual inspection will be made of the interior of the intake structure dry well for cracks and leakage. The regulating outlet conduit will be inspected as soon as possible following the start of power generation.

Reservoir. Major areas of concern around the reservoir are: Needle Rock Slide located on the right bank near the upstream end of the reservoir, Stewart Park boat ramp and dock located on the left bank, and the right bank boat ramp located just upstream of the right abutment.

At Needle Rock Slide a line of survey monuments has been established along the highway to check alignment and settlement. In addition seven slope indicator pipes were installed, four of these are below maximum pool and three above. Oregon State Highway Department is responsible for reading the slope indicators.

Most of the north shore of the reservoir does not have road access, however, this area is not important to the safety of the dam or relocations.

Monitoring Schedule.

Damsite.

- (1) Downstream drainage system weir - read daily.
- (2) Embankment and foundation piezometers - read daily.
- (3) Visual inspection of embankment dam, look for cracks in crest, check guardrail alignment, look for wet spots on downstream slope and at toe, look for erosion or sloughing on upstream slope - daily.
- (4) Visual inspection of right abutment slopes above Jasper Creek, look for seepage, wet spots, sloughing - each ten foot increase in pool level but not less than weekly.
- (5) Visual inspection of left abutment slopes above the terrace downstream to the spillway chute and the unlined chute walls, and the slope below the terrace downstream to the hatchery residence area - same as 4 above.
- (6) Visual inspection of the lower slopes on the right bank from Jasper Creek downstream to the old boat ramp and the left bank terrace slope in the residence area and above downstream to the spillway chute - weekly.
- (7) Visual inspection of the intake structure drywell - daily.
- (8) Visual inspection of regulating outlet conduit - as soon as possible following start of power generation and periodically as required.
- (9) Settlement and alignment monuments on crest of dam - monthly from initial reading unless 3 above indicates need for intermediate readings.

Items 1 through 8 will be taken care of by Project personnel and Item 9 by District survey crew. District team will inspect monthly

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and/or when the filling rate exceeds one foot in 8 hours for a period of 24 hours and is expected to continue at a rate higher than one foot per 8 hours for the following 12 hours. Should experience indicate that this schedule does not provide adequate coverage by the District team it will be adjusted.

Reservoir.

- (1) Visual inspection of Needle Rock Slide, Stewart Park boat ramp and dock, right bank boat ramp - daily.
- (2) Settlement and alignment monuments at Needle Rock Slide - monthly unless 1 above indicates need for intermediate reading.
- (3) Slope indicators at Needle Rock Slide - responsibility of State Highway Department.

Item 1 will be taken care of by Project personnel and Item 2 by District survey crew. District team will inspect monthly and/or when the filling rate exceeds one foot in 8 hours for a period of 24 hours and is expected to continue at a rate higher than one foot per 8 hours for the following 12 hours. The entire reservoir perimeter will be inspected by District Foundation & Materials Branch personnel following the first drawdown.

Routine and Alert Conditions. Daily, weekly and monthly readings will be considered routine by Project or District personnel. At anytime the filling rate exceeds one foot in an 8 hour period special alert monitoring activities will commence. Upon observing the special alert conditions the Surveillance Director will notify District Foundation & Materials Branch personnel alerting

the secondary inspection team. In addition the Surveillance Director will mobilize a twenty-four hour observation watch on the Dam, the abutment slopes and the area downstream of the dam. The Project will have on a ready condition portable lighting for night observations.

Increased flow from the downstream weir is expected and will be considered normal. Sudden increase in flow quantities or turbid flows will be reported to District Foundation & Materials Branch immediately.

Seepage will be expected at the dam toe and downstream in minor controlled amounts. The District Foundation & Materials Branch should be notified as soon as each of the minor seepage areas are found. Sudden increase in flow, large flows found or turbid flows will be reported immediately and may in the judgment of the Surveillance Director or the Project Engineer be cause for setting emergency procedures in action.

Reporting.

(1) Routine Instrumentation Readings and Visual Inspection Reports - by telecopier to District Foundation & Materials Branch - daily. District Foundation & Materials Branch will prepare weekly report for NPD and the Task Force. *(Include RCS number.)*

(2) Minor Seepage - by phone to District Foundation & Materials Branch who in turn will phone Task Force members.

(3) Major Seepage, Other Major Problems - by phone to Chief, Construction Division, who will notify the District Engineer and Chief, Engineering Division immediately.

APPENDIX C

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FISH EGG PROTECTION AND SURVEILLANCE

<u>Reference Number</u>	<u>Structure</u>	<u>Item</u>	<u>Responsible Party</u>
1	<u>Sprinkler Irrigation System</u>	Pumps, pipe and sprinklers will be set up to cover six areas of spawning beds. All needed equipment is on order or on hand. Delivery of pumps and pipe is scheduled for 1 Oct 76. These will be installed and test-operated during the week 4-8 October. This work will be done by Project O&M staff (including two temporary utilitymen). All systems will be tested again the day prior to closure.	Kenoyer
2	<u>Water Level Gaging</u>	Water Level Gaging of the spawning bed areas downstream will be done by driving steel fence posts, painted with 6" stripes, at selected locations in the river. Readings will be taken of water levels during spawning activity, especially at the time of aerial photo flights, at the time of closure, and at four-hour intervals thereafter until the river level returns to the point where irrigation is terminated. Readings will be taken by O&M staff, logged and recorded by Harry Weise.	Kenoyer
3	<u>Operation</u>	Operation of the sprinkler irrigation system will begin two hours prior to closure and continue as long as needed. Operation will be done by O&M staff supplemented by temporary utilitymen. A foreman and four men will be used for each shift. Two nine-hour shifts per day, every day are planned. During the remaining period per day, the operation will be monitored by a roving operator. Additional help, if needed, will be on call.	Kenoyer

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<u>Reference Number</u>	<u>Structure</u>	<u>Item</u>	<u>Responsible Party</u>
4	<u>Biological Surveillance</u>	Oregon Department of Fish and Wildlife is under contract to the Corps to estimate egg and fry mortality in the Rogue River below Lost Creek Dam due to closure. Mortality will be based on egg sampling, in-river survival experiments and simulated conditions of Cole M. Rivers Hatchery. Activities at Oregon Department of Fish and Wildlife will be observed by District Biologists. District Biologists will also maintain constant surveillance of redd protection activities until irrigation is terminated. It is estimated that a minimum of three persons will be required to accomplish Biological Surveillance.	Kenoyer

APPENDIX D

CONTINGENCY PLAN

1. Purpose: Purpose of this appendix is to provide a plan of action in case unusual water discharge occurs during filling of the pool or other event (earthquake, etc.) creates a situation of impending catastrophic loss of the dam.
2. Scope: This plan provides for a system of notification of emergency services personnel to provide a warning to all downstream residents and lists action to be taken by Portland District field and office personnel.
3. General: If at any time during the initial filling of the reservoir any serious seepage of the dam or foundation occurs, the outlet flow would be increased to lower the pool as much as possible and all necessary warning would be issued. The second part of the filling would be based upon filling at a scheduled rate of increased pool level. It is possible that extended and extensive rainfall could occur that would cause inflow to exceed the discharge capacity of the outlet. The pool level would then rise faster than the preplanned rate; however, as soon as possible the pool filling would be returned to the scheduled rate of rise.

Any serious seepage during a period in which inflow exceeds discharge capability of the outlet could create an extreme hazard.

If that condition occurs the Resident Engineer at Lost Creek will make a judgment as to the relative seriousness of the hazard based upon all information available to him (weather forecast, pool level, amount of seepage and location). Based upon his decision the Resident Engineer will

exercise the notification plan to warn local officials of: (1) a possible hazard or (2) issue a warning to evacuate local residents.

4. Notification Plan - In event a condition occurs that in the judgment of the resident engineer constitutes a threat to the lives of local residents the following notification plan will be implemented.

Resident Engineer notifies:

a. Department of Emergency Services - Salem - 378-4124 or 4125
(during non-business hours this line will be answered by the Oregon State Police Headquarters).

b. Jackson County Emergency Services - 776-7111.
(This is the central dispatch number at the Sheriff's Office)

c. Josephine County - 476-4444; Emergency Services 476-8163
(James Newly - Sheriff)

d. Resident Engineer will alert:

(1) R. Moore (primary),	Business: 221-6052
Chief, Construction Division	Home: 666-8529
(2) Colonel Harvey L. Arnold (primary),	Business: 221-6000
District Engineer	Home: 635-5376

Alternates:

LTC Melvyn Brown,	Business: 221-6002
Deputy District Engineer	Home: 646-8983

Vince Brownell	Business: 221-6003
Executive Assistant	Home: 206-693-0309

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Alternates:

Louis Henke

Business: 221-6053

Home: 666-6839

John Illias

Business: 221-6051

Home: 286-2362

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e. R. Moore or alternate to alert:

(1) G. McCoy,	Business: 221-6452
Chief, Foundations and Materials	Redland, Oregon
	Home: 631-2812

Alternates:

John Jenkins	Business: 221-6456
	Home: 206-694-4036

Duane Bankofier	Business: 221-6456
	Home: 761-6654

Dennis Hopman	Business: 221-6455
	Home: 233-1600

(2) L. Stein,	Business: 221-6916
Chief, Engineering Division	Home: 644-5068

Alternates:

J. Heutter	Business: 221-6917
	Home: 644-2573

P. Keough	Business: 221-6415
	Home: 656-3424

(3) Don Westrick,	Business: 221-6066
Chief, Project Operations	Home: 246-1047

Alternates:

Jack Braithwaite	Business: 221-6073
	Home: 206-694-4172

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Gail Gardner

Business: 221-6069

Home: 374-8246
Cascade Locks

f. Chief Operations or alternates to alert:

Jerry Schmunk

Business: 221-6055

Public Affairs Office

Home: 641-2813

Alternate:

Alene Jacques

Business: 221-6005

Public Affairs Office

Home: 232-4596

g. Chief, Engineering Division or alternate to alert:

(1) H. Heine,

Business: 221-6048

Chief, Design Branch

Home: 289-0745

Alternates:

Ray Milliron

Business: 221-6409

Home: 246-5870

Ivar Paavola

Business: 221-6903

Home: 288-4177

(2) Robert Waiste,

Business: 221-6010

Chief, Administrative Services

Home: 235-4320

Alternates:

Allen Salnave

Business: 221-6019

Home: 254-6192

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Ruth Mary Caldwell

Business: 221-6012

Home: 235-4421

Mary Johnson

Business: 221-6012

Home: 288-1667

5. Emergency Procedures - Initial action will be notification and issue of warning. In addition the resident and district offices will take the following action:

a. Resident Office -

(1) Issue warning to all Corps employees and all contract personnel in the area.

(2) Verify the local emergency services offices have released warning information to local radio and TV stations.

(3) If ordered by the resident engineer, evacuate Corps employees from areas immediately downstream of dam.

(4) Secure and protect all government property in area provided vehicles, tools, or other equipment can be moved to safe area without unnecessary risk of life.

(5) If the Resident Engineer's judgment is that the hazard can be controlled by use of contractor resources in the area, those resources will be called up immediately and committed to the emergency repair work.

(6) Keep the district office informed of action by field elements and state of the emergency situation.

b. Portland District Office -

(1) Upon notification of serious threat to the project all personnel listed in notification paragraph will proceed to the District Office. Upon

arrival they will assemble in the District Engineer's conference room for initial briefing and discussion of the problem.

(2) Following the initial briefing the Emergency Operations Center will be opened upon order of the District Engineer or his alternate.

(3) Contact will be established with the State and the Jackson and Josephine Counties emergency services offices.

(4) Public Affairs Office will prepare news releases to the news media.

(5) Administrative Services Chief or his alternate will call up clerical support as needed for travel, personnel or financial actions.

(6) Chief of Supply or alternate will be called in to support emergency hire of equipment or services if they are required.

(7) Division staff will be alerted to problem and kept updated on status.

(8) Contact with resident office will be maintained.

(9) Emergency Operation Planner will issue Situation Reports to other Federal offices as required by Army Regulation 500-60.

LOST CREEK POOL RAISE

Appendix E

Safety Plan

1. All Corps personnel in the field will wear hard hats for identification and will be fully authorized to act on any matter dealing with safety.
2. All instances of safety violations, hazardous conditions, or incidents, will be documented and logged.
3. Personnel should be firm, but tactful, in dealing with the public to protect them from hazards. If cooperation cannot be obtained, the situation should be reported immediately to the Resident Engineer.
4. If assistance is required to remove the public from the pool area, assistance will be available from the Resident Engineer's office and the Park Ranger will be dispatched.
5. All personnel are cautioned to be alert during surveillance activities due to the increased dangers of falls due to steep terrain, mud, and banks caving in from wave action. These dangers should be pointed out to any of the public observed near the reservoir.
6. The PAO and Safety Office will take action to inform the public prior to the pool raise of hazards expected.
7. All access roads into the pool area will be closed to the public.

LOST CREEK POOL RAISE

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Appendix F

Public Affairs

1. The PAO will be the primary contact with the news media.
2. On 8 October 1976 the PAO will release the attached news release.
3. The Chief, Construction Division will be responsible for keeping the PAO informed on the progress of the closure and pool filling operation and PAO will inform the news media.

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LOST CREEK LAKE CLOSURE

NEWS RELEASE
8 October 1976

Filling of Lost Creek Lake will begin sometime between October 15 and December 1, depending on water and weather conditions, the Portland District, U.S. Army Corps of Engineers, has announced.

Colonel Harvey L. Arnold, Jr., Portland District Engineer, said that there will be a slight reduction in water levels in the Rogue River for the first few days after closure. The reservoir will gradually rise during the winter months, except in the event of heavy storms, when water would be stored.

The public is advised to avoid approaching the lake shoreline during the time when the lake is filling since there is possible danger due to soft ground along the water's edge.

Closure of the diversion tunnel to begin filling of Lost Creek Lake is being coordinated with state and federal fishery agencies, Colonel Arnold said. To avoid adverse effects on the chinook salmon, the preferred condition for closure will be when weather is cool and cloudy and river levels are rising. This will minimize damage to fish eggs in the gravel. The date for closure will be set at a time when spring chinook spawning is completed, and weather and flow conditions are conducive to filling of the reservoir.

Salmon spawning areas which may be exposed by the temporarily lowered river levels will be irrigated to keep buried salmon eggs wet and cool until the river returns to average heights. Effects of the drop in water level on survival of spring chinook eggs will be monitored. If there are any losses to the eggs, they will be replaced by increased production at Cole Rivers Hatchery at the Lost Creek Lake Project, the District Engineer said.

APPENDIX G

PREFILLING INSPECTION TEAM RECOMMENDATIONS

First Periodic Inspection-Inspection Team Recommendations

The first inspection of Lost Creek Project, under the authority of Engineer Regulation 1110-2-100, Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures, was conducted on 19 and 20 July 1976. Lost Creek Dam, outlet works, spillway and powerhouse were found in satisfactory condition and are considered to be ready for operation. This was the last formal field review and check of the project before the initial pool raising and was intended to disclose any deficiencies that would require remedial action before lowering of stoplogs. The July 1976 inspection will be followed by an inspection when full pool is reached.

Inspection team members agreed, during the exit interview, that certain recommendations by the team are to be completed prior to the initial pool filling and a time schedule or study be established for the remaining items. A listing of all recommendations, including responsible organizations and when items are to be completed follows.

<u>Ref. No.</u>	<u>Structure</u>	<u>Item to Be Completed by 1 Oct 76</u>	<u>Responsible Organization</u>
1	General	A Reservoir Regulation Manual for the project is needed before operation.	Planning Br
2	Embankment Dam	Initial Filling Instrumentation Reading Schedule. The instrumentation reading schedule is to be as followed as itemized in Appendix B.	Project & District F&M
3	Needle Rock Slide	Monitoring schedule and slide contingency plan.	F&M
		<u>Items to be completed before Raising of Pool</u>	
4	General	Crack survey is to be made of all principal concrete structures. Spillway, spillway chute, spillway trunnion anchorage area, intake tower, regulating outlet, powerhouse, etc.	Project

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<u>Ref No.</u>	<u>Structure</u>	<u>Item</u>	<u>Responsible Organization</u>
5	General	Seepage survey downstream of dam. Flow from all drains and seeps and wet spots on abutment slopes should be recorded.	Project & F&M
6	General	A survey should be made of natural flow conditions downstream of dam from gullies, creeks, etc., during dry and high precipitation periods. This will be used as a reference during pool raising and after attaining pool head.	Project & F&M
7	General	Complete general cleanup of project, e.g., remove waste concrete invert of regulating outlet chute.	Project
8	Intake Tower	A seepage report is to be made of the intake tower dry well during the initial filling.	Project
9	Regulating Outlet	Vug holes in floor downstream of the steel liner are to be patched prior to R.O. operation.	Project
10	Regulating Outlet	Leakage of all contraction joints are to be documented prior to filling and after attaining pool head.	Project
11	Regulating Outlet	R.O. bulkhead slot. The surface downstream of the slot should be inspected for offsets not meeting specifications. The surface should be corrected by filling low areas and/or grinding down high points.	Project
12	Regulating Outlet	Nuts fastening guides for water control gates should be checked and tightened to support the guides where necessary. Open spaces behind the guides should be grouted as protection against corrosion and to provide shear resistance to the guides.	Project
13	Regulating Outlet Chute	All joints should be checked for humping and repaired as necessary.	Project
14	Embankment Dam	Installation of piezometers. Six piezometers are to be installed, one on each abutment, two on the right abutment slope, one in the valley floor at the toe of the left abutment and one on the left bank terrace in the area where the cutoff trench is deepest.	District F&M personnel coordinate w/Project

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Responsible
Organization

<u>Ref. No.</u>	<u>Structure</u>	<u>Item</u>	
15	Intake Tower	A tiltmeter should be installed on the intake tower deck.	Structures Sec
		<u>Items to be Completed Before</u> <u>1 July 1977</u>	
16	General	Fence survey of entire project. Safety fencing is to be installed where determined necessary. (Slopes of spillway chute are presently unprotected.)	Design Branch
17	General	Complete project documents such as construction history, concrete, foundation reports.	Project
18	Regulating Outlet	R.O. contraction joints should be marked for easy identification during inspections	Project
19	Spillway Chute	The plunge basin of the end of the spillway chute is a potential hazard area. A study should be made of methods to eliminate the hazard area and then correct as necessary.	District Design Branch Personnel
20	Spillway Chute	Shotcreting is required to cover and retain closely fractured rock on the left wall of the spillway channel. To be done at same time as Peyton Bridge.	District F&M Personnel
21	Peyton Bridge	The shotcrete protection on the soil interbed below the south abutment of Peyton Bridge is to be extended.	F&M Branch

Appendix H

Transportation and Communications

1. Transportation.

a. Transportation for members of the resident surveillance team will be provided by the Resident Office.

b. District surveillance team members or others not on the Resident Engineer or Project Engineer staff will arrange for their own transportation by contacting the Office of Administrative Services.

2. Communications.

a. Telephones are available on the project as follows:

(1) Resident Engineer's Office

FTS 422-2360

Commercial 878-2212

(2) Project Engineer's Office

Commercial 878-2255

b. Project vehicles used for surveillance activities will be equipped with radios. Two portable radios will be available at the project for use by the District surveillance crew. The call sign for the Resident Office is WUM-3485 and the Project Office is WUM-3560.

APPENDIX I
LOST CREEK LAKE
PERTINENT DATA

August 1971

GENERAL

Stream	Rogue River
County, State	Jackson, Oregon
Dam location	Sec. 26, 27, 34, T.33S., R.1E., W.M.
River mile above mouth	158.6
Drainage area - square miles	674
Airline distance from Portland, Oregon - miles	205 south
Airline distance from Medford, Oregon - miles	26.5 north
Spillway design flood - c.f.s.	169,000
Standard project flood - c.f.s.	64,500
Maximum discharge, observed (Dec. 1964) - c.f.s.	49,000
Mean annual discharge (1929-1965) - c.f.s.	1,886
Minimum monthly discharge (Sept. 1931) - c.f.s.	619
Mean annual runoff (1929-1965) - acre-feet	1,366,000

STORAGE AND PRINCIPAL ELEVATIONS

Usable storage - acre-feet	315,000
Flood control storage - acre-feet	180,000
Inactive storage - acre-feet	129,500
Dead storage - acre-feet	20,500
Total storage - acre-feet	465,000

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PERTINENT DATA (Cont'd)

August 1971

STORAGE AND PRINCIPAL ELEVATIONS (Cont'd)

Elevation - maximum (full) pool-feet, m.s.l.	1,872
Elevation - minimum flood control pool-feet, m.s.l.	1,812
Elevation - minimum conservation pool-feet, m.s.l.	1,751

LAKE

Area - maximum pool - acres	3,423
Area - minimum flood control pool - acres	2,609
Area - minimum conservation pool - acres	1,799
Length - miles	10

DAM

Elevation - top of dam - feet, m.s.l.	1,882
Length - feet	3,600
Maximum height - foundation to top of dam - feet	345

SPILLWAY

Type	Concrete gravity, gated, ogee section
Elevation of crest - feet, m.s.l.	1,823
Crest length - feet	135
Design discharge - c.f.s.	158,000
Control gates (tainter)	3 - 45' X 51'
Elevation - top of spillway gates - feet, m.s.l.	1,874

PERTINENT DATA (Cont'd)

August 1971

OUTLET WORKS

Type	Multiple-use intake tower, outlet tunnel, stilling basin
Operating slide gates	2 - 6'6" X 12'6"
Emergency slide gates	2 - 6'6" X 12'6"
Outlet tunnel	12'6" diameter, circular, concrete lined
Length - feet	943
Discharge capacity at minimum flood control pool - c.f.s.	9,860
Discharge capacity at maximum and full pool - c.f.s.	11,460
Temperature control	Multiple level intake
Openings	At 4 levels
Openings each level	3 - 8'0" X 15'0"

POWER FACILITIES

Powerhouse	Indoor
Number of units	2
Type of turbine	Francis
Rating of each unit - KW	24,500
Installed capacity - KW	49,000

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